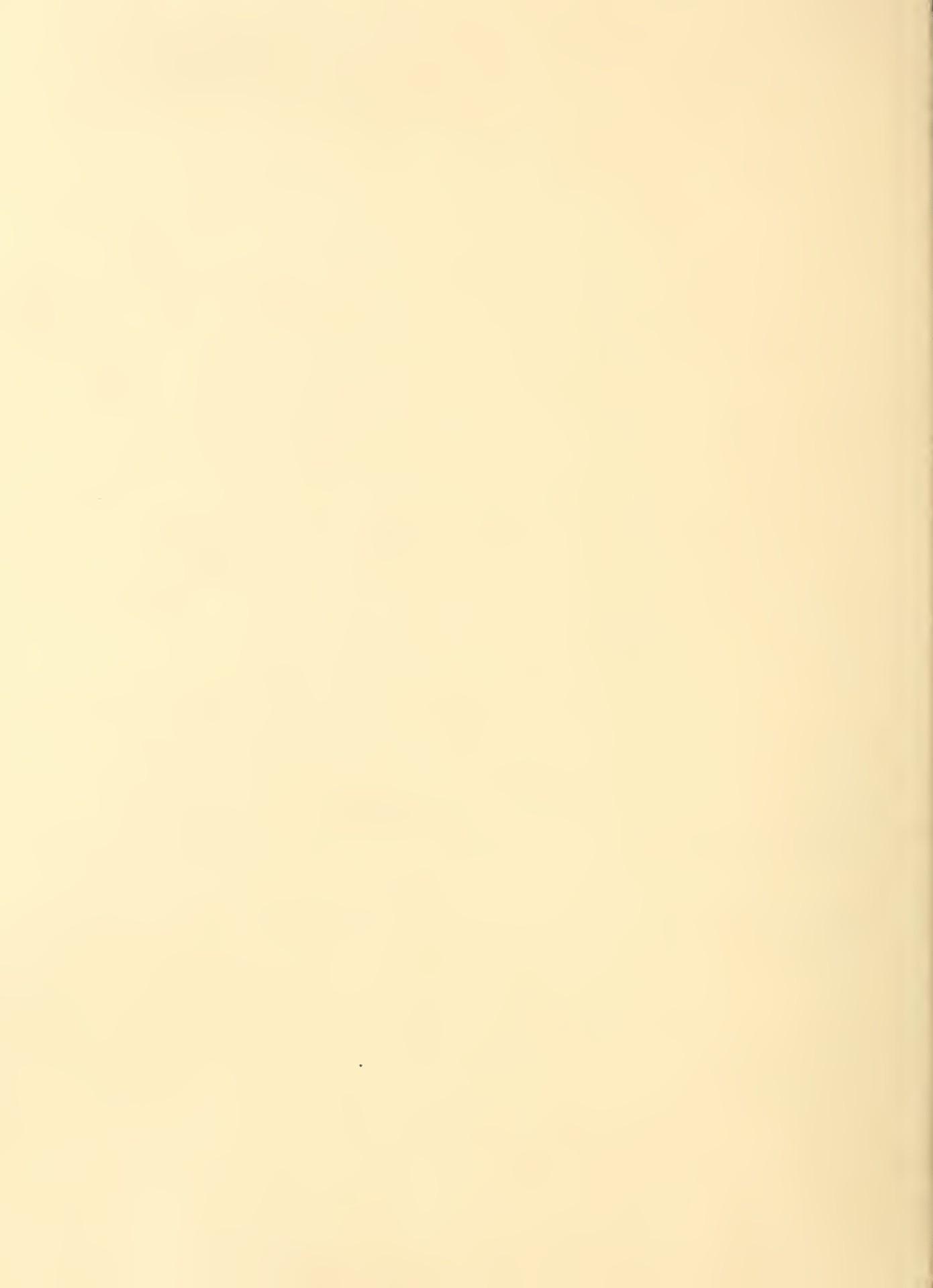


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## UNITED STATES DEPARTMENT OF AGRICULTURE

## SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports\*  
for  
SOIL CONSERVATION SERVICE RESEARCH\*\*

OCTOBER 1948

EROSION CONTROL PRACTICES DIVISION

Land Use, Soil Treatment, and Conservation, Spring Lake Watershed, Macomb, Illinois - E. L. Sauer, Urbana, Illinois. - "A survey study of the land use on the Spring Lake watershed, Macomb, Illinois, shows that there has been much land abuse in the area. The watershed is relatively large, and the lake relatively small. Observations indicate heavy silting in the upper end of the lake. Permanent pastures and timber stands on the shore line are eroding badly.

"Farm leaders in the community estimate that at least 20 percent of the watershed that is now in cropland should be retired to permanent pasture or timber and that the balance of the cropland needs soil treatment and good rotations. At the present time considerable acreage of permanent pasture is on level or nearly level land that could be used more productively in the rotation. The permanent pastures need soil treatment and reseeding, and the timber stands should not be grazed. Most of the watershed is in Emmett Township, although the upper end of the watershed is in Sciota Township. Data on land use in Emmett Township for the years 1938-47 are shown in table 1. Although only approximately 59 percent of the farmland is tillable in Emmett Township compared to 71 percent for McDonough County as a whole, the tillable land is being cropped much harder in Emmett Township. At the present time 63 percent of the tillable land is in inter-tilled crops--corn and soybeans--in Emmett Township, and only 15 percent is in rotation hay and pasture.

"The upper end of the Spring Lake watershed in Sciota Township is cropped even harder than the land in Emmett Township. Sciota Township is referred to by many in the area as the 'mud flats,' and following heavy rains the mud literally floods off of much of this land, downstream.

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\*\* All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

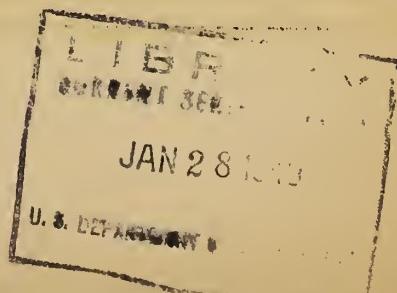


Table 1.-- Land Use, Emmett Township, McDonough County, Illinois, 1938-47<sup>a/</sup>

Items	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947 b/
Acres per farm	130	129	127	131	138	132	135	134	136	
Percent of farm tillable	59	58	58	59	59	58	59	58	59	58
Percent tillable land in:										
Corn	41	38	39	37	37	43	47	43	46	41
Soybeans	14	18	16	15	22	19	21	21	17	22
Small grains	28	27	22	25	17	20	10	19	20	17
Hay and pasture	14	15	20	21	23	15	21	14	16	15
Other and idle	3	2	3	2	1	3	1	3	1	5

a/ Based on assessor's acreage census.

b/ Preliminary data.

"Six farms in the Spring Lake watershed now have conservation plans. The soils on the farms having conservation plans are summarized in the following table." (Table 2).

"An analysis of the conservation plans indicates the need for land-use adjustments (Table 3). For each 100 acres of total land in farms, corn and soybeans should be reduced by 6 acres, and hay and rotation pasture increased 17 acres. The conservation farm plans call for a smaller total acreage of permanent pasture. This is due to the fact that a considerable part of the present acreage of permanent pasture is on land that is capable of producing grain crops in a well-balanced rotation. Some of the land that is now in grain crops should be retired to permanent pasture.

Table 2.--Summary, Soil Conservation Survey, Six Farms, Spring Lake  
Watershed, McDonough County, Illinois

Land-Use Capability Class	Percent of farm in each land use capability class
I--Suitable for cultivation without special practices	54
II--Suitable for cultivation with precaution	28
III--Suitable for cultivation with major precaution	12
IV--Land suitable only for occasional cultivation	0
V--Not suitable for cultivation	0
VI--Land suited only for permanent vegetation and requiring moderate restrictions in use	4
VII--Land suited only for permanent vegetation and requiring severe restrictions in use	2

Table 3.--Summary, Land Use, Six Farms, Spring Lake Watershed,  
McDonough County, Illinois

Land Use	Percent of total land in farms	
	Actual, 1945-47	Future, based on con- servation farm plan
Corn and soybeans	41	35
Small grain	16	20
Hay and rotation pasture	8	25
Permanent pasture	29	15
Other	6	5

"Since detailed soil conservation data are not yet available for the Spring Lake watershed, the soils data from the six conservation farm plants and data from a survey of additional sample farms are projected for the entire watershed in Table 4. Based on the analysis of the available data, corn and soybeans acreage for each 100 acres in farms should be reduced from 44 to 30, small grains increased from 12 to 15, and hay and rotation pasture increased from 9 to 30 acres. Although some of the present acreage in corn and soybeans should be retired to permanent pasture, the total acreage of permanent pasture could be reduced from 29 to 20 acres in each 100 acres in farms.

Table 4.--Present and Recommended Land Use, Spring Lake Watershed,  
McDonough County, Illinois

Land Use	Percent of total land in farms	
	Present use a/	Recommended use b/
Corn and soybeans	44	30
Small grains	12	15
Hay and rotation pasture	9	30
Permanent pasture	29	20
Other	6	5

a/ Based on assessor's and census data and survey of sample farms applied to watershed data.

b/ Based on land-use recommendations according to use capabilities for sample farms applied to watershed data.

"In addition to better land use, supporting soil conservation and erosion control practices are needed in the watershed. A study of the six conservation plans shows that the soils should be tested and limestone, phosphate, and in some cases potash applied according to tests, in order to secure adequate stands of legumes and grasses. Waterways need to be shaped, fertilized, and seeded. Existing waterways need to be widened and properly maintained by mowing and removing the hay. All sloping land should be contour farmed, and terraces are needed on many of the sloping fields to control adequately runoff and erosion. Rotational grazing should be practiced on both permanent and rotation pastures. Permanent pastures should

be cleared of brush, renovated, treated, seeded, and mowed to prevent weed growth. In a few instances masonry dams or flumes are needed. For the most part sod flumes and adequate vegetation in the waterways should be sufficient. Timber pastures should be fenced and livestock kept out in order for economical growth of timber to be secured."

Average Percent of Moisture per Foot of Soil to a Depth of Five Feet in Summer Fallow, Froid, Montana. Samples taken October 1, 1948 -  
Torlief S. Aasheim, Bozeman, Montana.-"

* Fallow Method	% Moisture Per Foot
Chem. spray - fall chiseled	13.8
Chem. spray	13.3
Sub-surface tiller - fall chiseled	14.8
Sub-surface tiller	15.1

\* Chemical fallow was sprayed on May 24 and June 25 with .4 lb. of 2-4-D per acre. This quite effectively controlled most weeds but it was necessary to sub-surface till all sprayed plots on July 27 to kill volunteer wheat, wild oats, green foxtail and wild buckwheat. Fall chiseling was done August 28.

"On all chemical fallow plots that were not fall chiseled there is a considerable amount of stubble still standing which will catch considerable snow this winter. The fall chiseling operation knocked down and covered a good deal of stubble. The chiseled plots are not apt to hold much snow this winter."

Tomato Irrigation at Sodus, New York - E. A. Carleton, Geneva, New York. - "The last picking of tomatoes at the irrigation project at Sodus, was made October 1 -- three days before the first killing frost. Data from this experiment accompany this report. There was delay in ripening on the irrigated plots and a lowering in grade. The fruit in general was heavier, the yield greater, and there was less blossom-end rot where irrigation water was applied. Soil samples have been taken from all plots."

Grain Yields Boosted by Contouring at Marcellus, New York - G. R. Free, Marcellus, N. Y. - "Comparisons of yields from plots plowed and planted with the slope with those from plots plowed and planted on the contour have been underway at Marcellus since 1942. The results are getting to be rather an 'old story' by now perhaps, but from another standpoint they are just beginning to get interesting. During the first years of the experiment, higher yields from contouring were probably mostly due to moisture and nutrient conservation through reduction of runoff. Now the effects of differential erosion and soil movement during tillage are showing up. This year, where yields on one set of the contour plots were 39.9 bushels per acre compared to 33.6 on the other plots -- a difference of 6.3 bushels per acre. Oat yields on another set of contour plots were 49.1 bushels per acre compared with 44.8 -- a difference of 4.3. In the case of oats, the yield difference was 6.1 bushels per acre for the upper third of the plots, 3.8 bushels for the middle third, and 2.9 for the bottom third. These plots are 100 feet long on a 10-per cent slope. Tillage has moved a lot of soil away from the top third of the plots in the case of operations with the slope, while contour plowing turning up hill has not."

Soil Conservation School for County Agents - G. R. Free,  
Marcellus, New York.-"A one-day meeting was held at the Marcellus station on October 15 with an attendance of about 40. Emphasis was placed on land use and on soil management factors effecting erosion and runoff. The importance of organic matter and the use of manure and crop residues was emphasized from the standpoint of their effect on soil structure."

Brush Control - Harley A. Daniel, Guthrie, Oklahoma.-"Maurice B. Cox studied the effect of seasonal cutting of brush and trees and found that more time was required for land clearing with portable saws during the winter season than during the spring and summer. The man hours per thousand trees for the different seasons were: winter - 15.4; spring - 7.4; and summer - 8.0. The major reason for the increased time required for the winter clearing apparently is due to the difficulty in cutting resulting from the dormant stage of the trees. Saw blades remained sharp longer and cut faster during the growing season than during the dormant stage. Winter cutting also requires that saw teeth be more carefully shaped and maintained.

"Harry M. Elwell and Maurice B. Cox made preliminary tests in July 1948 with an Orchardair air blast sprayer and found that good control of scrubby oak was obtained with 50 gallons of liquid and 100 pounds of Ammate per acre. The hydraulic type spraying machine, under comparable conditions and control, required 300 pounds of Ammate in 300 gallons of water per acre. Thus the air mist machine utilized only one-third as much Ammate and one-sixth as much water as the hydraulic machine."

Wheat Yields in Relation to Tillage Practices - C. L. Englehorn, Fargo, N. D.-"The wheat crop was harvested from the tillage plots at Langdon during the first part of September with yield results similar to those obtained during the preceding years. The yields according to the method of tillage used in seedbed preparation under continuous cropping are included in Table 1. As usual at Langdon fall plowing produced the highest yield, 29.9 bushels as an average of three replications. Spring plowing which usually produces a few bushels less than fall plowing at this station this year produced 29.8 bushels or a yield equal to that of fall plowing. Those tillage procedures which maintained more of the stubble residues at the surface produced a lesser yield. Tillage with the oneway disk produced 25.2 bushels; with the field cultivator, 24.4 bushels; and stubble-mulch or subsurface tillage, 24.2 bushels. These three methods produced essentially equal yields.

Table 1.--The yield of wheat according to the method of tillage used for seedbed preparation under continuous wheat at Langdon, 1948.

Tillage Method	Yield of wheat, bushels an acre			
	1	2	3	Average
Plow, fall	31.3	30.3	28.0	29.9
Plow, spring	31.7	30.3	27.3	29.8
Oneway disk, fall	26.0	25.3	24.3	25.2
Field cultivator, fall	23.3	24.7	25.3	24.4
Stubble mulch, fall	23.3	25.0	24.3	24.2

"The yields obtained from summer fallow are included in table 2. In this case yield varied less with tillage method. Fallow tilled throughout the season by means of the field cultivator produced the highest yield, 29.2 bushels. Fall pitting of plowed had no effect on yield. The yield from stubble mulch essentially equalled that from plowed fallow.

Table 2.--The yield of wheat according to the method of tillage used for summer fallow at Langdon, 1948.

Tillage Method	Yield of wheat, bushels an acre			
	1	2	3	Ave.
Plow	28.3	28.3	26.7	27.8
Plow and pit	28.0	27.8	27.2	27.7
Field cultivator	28.8	29.5	29.2	29.2
Stubble mulch	26.7	27.3	27.0	27.0

Effect of Vetch Winter Cover on Corn Yield - T. N. Jones, State College, Mississippi.-"The corn on the erosion plots was harvested during the early part of October, and the yields are as follows:

Slope	Yield - without Vetch	Yield - with vetch
2.5	44	53
5.0	35.4	43.8
7.5	36.4	47.5
10.0	37.0	45.3
12.5	48.7	47.8

"The extremely dry weather during the growing season greatly reduced the yields from this fine stand of corn. During the period April 13 to July 11, only 3.25 inches of rain was received as contrasted with an average figure of about 12 to 13 inches. Although the corn yields are not more than half of what this stand should have given, it is of interest to note the rather significant trend toward higher yields following winter cover of vetch. With the exception of the 12-1/2% slope plot, there is apparently considerable effect of the vetch in increasing the yields of corn on these plots."

Pasture Studies - C. J. Whitfield, Amarillo, Texas.-"A summary of the grazing studies for the past year on the Amarillo Conservation Experiment Station is as follows:

A. Wintering: November 1, 1947 to April 1, 1948 - 152 days  
Weight at purchase, Nov. 1, 1947 - 410 lbs.  
Apr. 1, 1948 - 555 lbs.

Average daily gain .95 pound; calves were wintered in Pasture H, Lake Pasture, with 2 pounds cottonseed cake daily.

B. Summer Gains:

Lot No. 1 on seeded pasturage:  
Cool Season Grasses and Sudan

April on Crested Wheat	-	2.66 lbs.
May on Wheat	-	3.23 lbs.
June on Reseeded Mixture	-	2.16 lbs.
July on Sudan	-	1.31 lbs.
August on Sudan	-	1.79 lbs.
September on Sudan	-	1.44 lbs.
Average for 180 days	-	2.10 lbs.

Weight - April 1	-	555 lbs.
Weight - Sept. 28	-	933 lbs.
Gain (180 days)	-	378 lbs.
Daily gain	-	2.10 lbs.

Gains from December 1, 1947 to September 28, 1948:

35 - 7 V's  
457 lbs.

35 - 7 X's  
469 lbs.

Strip Crop Patterns on Terraced Land in the Southern Piedmont -  
B. H. Hendrickson, Watkinsville, Ga., - "When a good Class III land rotation like oats-lespedeza, volunteer lespedeza, and cotton is used on appropriate long terraced slopes in the Southern Piedmont, the following 'danger points' apply to different strip crop patterns:

(1) By terrace intervals:

"The oats / 1st year lespedeza strips are subject to high runoff. The volunteer lespedeza strip provides relatively low runoff, practically no erosion. The cotton strips in rotation permit moderate runoff and erosion. There are two 'danger points', with this pattern of strip cropping during excessive storms, especially if terrace channel capacities are inadequate. The oats / 1st year lespedeza terrace may overtop; the cotton terrace silt-up and overtop.

(2) When strips straddle the terraces:

"(a) If the oats / 1st year lespedeza strip is placed upslope and adjacent to the cotton strip, there is danger that high runoff from the lower half of the oats / 1st year lespedeza strip will at times overwash the upper half of the cotton strip, and cause excessive silting and liability to ridge breakage.

"(b) When the volunteer lespedeza strip is placed upslope and adjacent to the cotton strip, maximum protection is obtained. There is a minimum of runoff from volunteer lespedeza during most of the excessive storms, to flow across the cotton rows. Below the cotton terrace, eroded soil washing off of the lower half of the cotton strip must cross the upper half of the close-growing oats - 1st year lespedeza strip before reaching the terrace channel. These conditions favor deposition of eroded soil from the row crop in the interval rather than in the channel.

"This pattern and order of cropping on the sloping terraced field supplies maximum protection obtainable with this rotation. It distributes runoff more equally to the terrace channels than is possible when each cropping strip occupies an entire terrace interval. Furthermore, it reduces - in effect - the slope length of the more erodible row crop by one-half, which in itself eliminates substantially more than half of the soil erosion from the row crop strips, and the amount of silting in the terrace channel accordingly.

"The terrace-straddling strip pattern of crop rotation placement on sloping fields has been maintained for several years on a long-slope Class III land field on the Station. Observations indicate that soil and water losses have been minimized, and crop yields have increased.

"While this method has not found wide acceptance by farmers, it is recommended as a practical and wise application of proven soil conservation principles."

Field Plot Studies on Soil Structure - D. S. Hubbell, State College, New Mexico.-"Preliminary data are now available for field plot studies on soil structure. Although the data in the following table do not show differences in water stable aggregates, they do show differences in friability, as determined by penetration and granulation.

Treatment	% Granulation**	Penetration** Lbs. per 1/16"	% Water Stable aggregates*
Flat irrigated	23.5	48.7	76.0
Double row (irrigated)	40.9	18.4	77.2

\* Differences are not significant

\*\* Differences are highly significant

"From the available data, the rest of which will be given in next month's report, it would appear that losses in soil structure must be measured in two forms. The first form is a permanent loss of structure and is measured by a decrease in waterstable aggregates. For example, such a loss can be caused by black alkali and is always associated by a loss or a physical change in the water-stable aggregates.

"The second form involves a temporary loss in structure and may be measured by penetration or by degrees of granulation. This loss of structure may be caused by compaction or overwatering and neither treatment seems to affect the water-stable aggregates.

"In case of a permanent structure loss, the soil loses its friability as well as its water-stable aggregates, and it seems that you cannot have one without the other. Returning such a soil to a friable state is only accomplished with great difficulty.

"In case of a temporary structure loss, friability may be restored by such means as wetting and drying or freezing and thawing in a very few days."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Available nitrogen in the soil on the corn plots reached the lowest content of 6 years of record. The table on page gives the nitrates throughout the 1948 corn season. The nitrates in the soil for these same plots in 1944 is given as a comparison."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"No runoff occurred on the project during October, with only small rains the first and last part of the month totaling 0.82 inch. The rainfall this year can be summed up as follows:

Period	Rainfall		
	Actually Received : 51-Yr. Average:	Deficit	
Inches	Inches	Inches	
Jan. 1 to Oct. 31, 1948	15.94	22.31	-6.37
Aug. 1 to Oct. 31, 1948	2.82	6.98	-4.16

"A field day was held on October 18, for the Soil Conservation Service Boards of Supervisors, Soil Conservation District supervisors, technicians, and county agents from five counties in south central Nebraska. Dr. Duley and Professor Russel were present and the tour included all the research studies which are under way on this project. One of the demonstrations that attracted considerable interest was the actual yields of corn from three watersheds under different land-use practices, which were cribbed for visual inspection. The cribs contained approximately 25 bushels each. Corn from a straight row watershed filled 3-1/2 cribs, while corn on the contoured filled 4-1/2 cribs and the corn from a subtilled watershed filled 5 cribs. The following tabulation on corn yields and peak rates of runoff were presented.

Watershed No.:	Land Use	Average Yield	Corn at \$1.40	Peak Rates of Runoff 1/ July 18, 1948
6-H 15-H	Corn St/Row	23.0 Bu/acre	\$32.20/acre	3.28"/hr.
7-H 9-H	Corn Contoured	28.7 Bu.	\$40.18/acre	1.77"/hr.
10-H 20-H- 23-H	Corn Subtilled	29.7 Bu.	\$51.58/acre	1.15"/hr.

1/Storm of July 18, 1948 produced the highest average peak rates of runoff for the year. Total rainfall .93 inch, fell in 16 minutes, maximum 5-minute intensity 6.00 inches per hour.

Table 1.--Data on nitrates in soil from mulch plots  
1944 and 1948

Sampling date	Nitrates			
	Plowed		Disked	
	Manure	Residue	Manure	Residue
	Lbs/A <sup>1/</sup>	Lbs/A	Lbs/A	Lbs/A
April 19, 1944 <sup>2/</sup>	6.1	5.7	3.7	8.0
May 31, 1944	68.6	46.7	85.8	82.2
June 15, 1944	62.0	58.1	63.6	72.0
July 4, 1944	69.7	48.0	55.1	65.0
July 26, 1944	51.0	44.2	25.6	27.2
August 15, 1944	23.3	17.9	13.3	17.5
September 19, 1944	17.5	16.0	5.6	5.4
Corn yields, bushels per acre	87	96	98	96
	Manure Cult.	Manure 2,4-D <sup>3/</sup>	Manure Cult.	Manure 2,4-D <sup>3/</sup>
May 26, 1948	22.3	19.4	14.5	18.4
June 15, 1948	39.4	41.9	40.1	41.9
July 15, 1948	31.5	34.7	23.3	17.4
August 16, 1948	2.1	1.6	1.5	2.5
September 10, 1948	3.2	3.7	2.7	2.7
Corn yields, bushels per acre	Not yet determined	Not yet determined	Not yet determined	Not yet determined

1/ Pounds per acre nitrate nitrogen (N)

2/ Sampled before tillage for corn .

3/ One cultivation before corn was up followed by chemical weed control, post emergence.

"In other words corn on the contour was worth \$8 per acre more than corn in straight rows and subtilled corn was worth over \$9 per acre more than corn planted in straight rows. Maximum peak rates of runoff were reduced almost half by contouring and by subtilling was reduced almost two-thirds over corn planted in straight rows."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"Soybean samples were threshed and weighed:

Table 1.--1948 soybean yields<sup>1/</sup>, experimental watersheds  
Purdue-Throckmorton Farm, Lafayette, Ind.

Treatment	Watershed No.	Bu./A. <sup>2/</sup>
Conservation	2	34.2
	11	40.6
	Av.	37.4
Prevailing	4	27.0
	12	32.0
	Av.	29.5

1/Av. of 6-2/3' x 7' samples at 50' x 50':

2/Corrected to 13.5% moisture.

"It will be noted that the average difference between the prevailing and conservation treated watersheds was about 7 bu/A. There was no fertilization of the beans under either treatment and the yield difference is attributable to residual effects of previous treatment of the watersheds, and increased moisture available for the crop on the conservation treated watersheds resulting from reduced runoff.

"During the crop period of the beans the prevailing treated watersheds lost an average of 5.7 percent of the rainfall, whereas the conservation treated watersheds lost an average of 3.6 percent. The difference in the runoff losses for the two treatments during the growing period of the beans amounted to 0.63 inch of water.

"Mr. Jongedyk and Mr. Finley completed a subsidence survey of the experiment plots. The results are included in the following table, summarizing the subsidence measurements over a 5-year period:

Table 2.--Subsidence on muck drainage plots<sup>1/</sup>  
Purdue Muck Experiment Station-Walkerton, Ind.

Year	Surface Elevations in Ft. (assumed datum el.) <sup>2/</sup>											
	45-inch water table		30-inch water table		Variable water table		15-inch water table					
	Plot 1	Plot 8	Plot 3	Plot 6	Plot 2	Plot 7	Plot 4	Plot 5				
1943	98.29	98.67	98.44	98.36	98.91	98.17	98.55	98.23				
1944 <sup>3/</sup>	98.27	98.71	98.41	98.49	98.90	98.35	98.62	98.45				
1945	98.04	98.45	98.23	98.25	98.76	98.12	98.51	98.24				
1946	97.77	98.30	98.09	98.12	98.66	98.03	98.43	98.17				
1947	No survey made											
1948	97.69	98.22	98.03	98.07	98.58	98.02	98.33	98.02				
Subsidence in feet												
Loss '43- '48	.60	.45	.41	.29	.33	.15	.22	.21				
Av. Loss/ year '43- '48		0.10		0.07		0.05		0.04				

<sup>1/</sup>150'x220' in size. Only inner 100'x180' considered (excluding roadways)

<sup>2/</sup>Except 1943, when 24 readings were averaged, all elevations represent 35 readings.

<sup>3/</sup>1944 Survey made on plowed ground. (Some settling)

Hydrologic Studies - G. A. Crabb, Jr.-"Precipitation for the month of October, as measured by the U. S. Weather Bureau type of non-recording rain gages, amounted to 0.59 inch at the cultivated watershed, 0.64 inch at the wooded watershed, and 0.57 inch at the stubble mulch plots. This is approximately 24 percent, 26 percent, and 23 percent of the 2.47 inches normal for East Lansing. This precipitation was abnormally low for this area constituting the fourth lowest October rainfall for the period of record, 1864 - 1948. However, no extreme adverse effect on crops has been conspicuous.

"On October 1 hydrologic and crop data were made available to Mr. Ferris, Michigan Chief of the U. S. Geological Survey. Considerable interest had been expressed by his office in regard to the soil moisture records of this project and their possible use in a more detailed study of Michigan ground water determinations. Conversations on the matter will be continued with the possible goal of full cooperation between the two agencies.

"On Thursday, October 7, the Project Supervisor met in the office of Dr. Gardner of the Michigan Agricultural Experiment Station with representatives from the Departments of Biology and Forestry and other personnel of the experiment station to discuss the feasibility of correlating solar radiation data with tree and plant development. It was decided that such correlation could be made, using the pyrheliometric data now being gathered in conjunction with a micro-dendrometer now available at the experiment station. It was decided that serious evaluation of this question and planning of the study would be made with an eye towards using a candidate for the degree of Ph.D and one or more candidate for the MS degree to perform the actual studies. Naturally, this future use of project data was encouraged by the Project Supervisor. Full details will be submitted to the Washington Office as they come out of the formative stage."

Hydrologic Studies - R. W. Baird, Waco, Texas.-"Rainfall for the month of October totaled 0.64 inch. This fell during the period October 16 and 17. This rain was sufficient to germinate part of the fall-planted crops, particularly oats and clover, but was not sufficient to germinate all seed and, unless more rain occurs soon, some fields will probably need replanting. At the end of the month all fields were very dry with practically no moisture except a small amount between 4 and 12 inches. Rainfall for the year 1948 to date is about 8 inches below normal and at no time since the spring of 1947 has the subsoil been completely saturated.

"The harvesting of cotton on the Government-owned land has been completed. The average yield on those parts operated by hired labor was about 250 pounds of lint per acre. The following table gives the yields for the various treatments:

Rotation	: Length of rotation	: Yield of cotton per acre
Oats with Hubam Clover, Cotton, Corn	3 years	231.5
Oats with Hubam Clover, Corn followed by winter peas, cotton	3 years	133.9
Hubam Clover, cotton	2 years	330.0
Cotton, corn	2 years	252.5
Continucus cotton		105.8
Cotton, corn, cotton, oats	4 years	163.1

"Yields for the 2-year rotation of Hubam Clover and cotton continue to be much higher than any other treatment. For 1948, the yield following Hubam Clover with oats in a 3-year rotation is about the same as the cotton, corn, 2-year rotation. This year planting date had a major effect upon cotton yields. The production of early-planted cotton this year was much greater than for the late-planted cotton. This will account for the relatively low yield of the 3-year rotation oats with Hubam Clover, corn followed by winter peas and cotton. With this rotation it is almost impossible to have fields in a condition for early planting. Likewise, due to the larger areas, it was impossible to plant early all of the cotton in the 3-year rotation oats with Hubam Clover, cotton, and corn. Some further work is needed before we can analyze the results from the tenant operated farms. The data from these areas will be reported as soon as possible."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"The installation at Colby, Wisc. was completed during the month with the exception of the heating elements. These will be added whenever the REA builds the line to the station. Soil moisture samples of this area were taken in fair detail on September 30. In general, these samples indicated moisture near the wilting point at depths varying from 6 to 18 inches. The State soil scientist was asked to have a soil survey of this watershed made.

"Precipitation at Fennimore was 1.65 inches as compared to the normal of 2.3 inches. There was no surface runoff. The total accumulated runoff for the year through October 31 was 20.3 inches or nearly 9 inches below normal. All of this deficiency occurred during the period of May 20 to October 31.

"Temperatures for the month varied from the maximum of 70° on the 26th to a minimum of 20° on the 17th, with a mean of 49° which is about normal.

"Precipitation at Edwardsville was 3.85 inches. There was little surface runoff. The accumulated rainfall for the year through October 31 was 33.2 inches which is nearly normal. Temperatures varied from a maximum of 79° on the 1st to a minimum of 19° on the 18th, with a mean of 51° or about 7° below normal."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.- "Early in the month Mr. Donnelly tested a second design for the straight drop spillway structure B-6. This design was based on that shown on page 48 of University of Wisconsin Research Bulletin No. 122 by L. H. Kessler entitled 'Erosion Control Structures - Drop Inlets and Spillways'. This type of energy dissipator consists of two rows of transverse sills located on a horizontal apron.

"The test area at Cinclare Plantation testing the feasibility of widening the cuts by grading them (turtlebacking) was planted the last of September. This area consisted of six cuts which were made into three cuts and graded (turtlebacked) during the summer. The cuts originally were 13 row cuts approximately 88 feet wide and were made into 27 row cuts approximately 176 feet wide. This area is black land.

"One area was mole drained the week of September 27 for the purpose of testing new mole machine developed at the project. The machine worked excellently and as a winter project the finished machine will be constructed incorporating some refinements and also make it applicable for attaching to all tractors.

"Mr. Postlethwaite of Washington photographed the machine in operation, also photographing field operations of turtlebacking and allied sugarcane subjects."

Drainage Studies - T. W. Edminster, Blacksburg, Va.-"Mr. Turner reports that laboratory permeability determinations have been completed for Sites No. VA-122 through 131. These sites include several that were run for the consultation work on the Chincoteague Naval Air Base.

"Mr. Turner has spent a considerable part of the month in preparing a report on the use of fiducial limits as a means of reporting the variations shown in the permeability data. This approach seems to be a valuable one in that it gives the user of the data some indications of the trends that existed within the replicates. It is planned that this paper will be mimeographed and made available to others dealing with permeability data."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Ga.- "Rainfall at the supplemental irrigation plots was recorded during October as follows:

October 4 = 0.30 inch, 9 = 0.42 inch, 12 = 0.11 inch,  
16 = 0.25 inch and 25 = 0.12 inch for a total of 1.20 inches. Normal rainfall = 2.93 inches. Evaporation for the month was 3.445 inches from the pan. The first frost of the fall was on October 19, 2 weeks earlier than normal.

"The supplemental pasture with Alta Fescue, Ladino Clover, Volunteer Crimson Clover and Volunteer ryegrass (on upper 2/3) was irrigated 1.0 inch on October 28-29. The Ladino Clover area of the permanent pasture was also given 1.0 inch of water on the 28th.

"Corn in the early planted areas (Blocks I, II, and III) was harvested. The stand was quite irregular, due largely to severe crow damage after germination. Four fertilizer and stand variables were superimposed on the 3 variables of irrigation.

"The results of the test of this structure were completely unsatisfactory since a deep scour hole was formed in a short time. Mr. Donnelly then modified the design, and found several satisfactory solutions to the problem. The most economical solution appears to be the use of a single row of blocks located at the position of the upstream sill. The downstream sill is retained. The basin was shortened and flaring wingwalls triangular in elevation were recommended. The wingwalls were not necessary from a hydraulic standpoint but probably would be required to retain the fill and increase the length of the seepage path through the dam. The scour obtained with this arrangement extended only slightly below the floor of the apron and the water flowed smoothly away from the structure. One foot less tailwater was required for this design than for the Morris-Johnson design tested last month and the depth of the scour hole was about 2 feet less."

Farm Ponds - T. W. Edminster, Blacksburg, Virginia.-Mr. Holtan, in charge of the farm pond sealing studies, reports that:

"The work mentioned in previous reports concerning voids and particle size as studied with various grades of sand as well as work previously reported on sealers and dispersing agents lead to the conclusion that particle size range and distribution were the basic factors involved in these pond sealing studies. An apparatus that was designed and fabricated for the purposes of studying these factors consists of a sedimentation tube as used and described by Wiegner, 1917. The principle of this sedimentation tube is that the difference in the elevation between a clean water surface and a connected suspension surface is due to differences in density. Wiegner's method was altered to the extent that the clear water manometer was contained in a small 1/4-inch tube placed on a tangent to magnify its scale.

"The sedimentation tube was calibrated using a thoroughly dispersed paratol clay (sub-bentonite or non-swelling) and with salt. Known amounts were used to create known densities and the tangent scale was calibrated against these.

The project supervisor included with his report a typical curve obtained with this unit. "The equation of this and other curves is of the type  $\% = aT^n - k$ . In this equation  $a$  (the value of  $\%$  at  $T = 1$ ) reflects the amount of sand approximately since one unit is very nearly the settling time for sand.  $n$  (slope of the curve) reflects the range of particle size; that is, a greater value of  $n$  indicates a steeper slope and a lesser range.  $k$  (which is the value added to the original curve to make the points fall on a straight line) reflects the shape of the curve or the particle size of distribution over the range.

"We are highly optimistic concerning this equation. We hope that  $a$ ,  $n$ , and  $k$  will relate themselves either individually or collectively to such characteristics of soil as compaction, permeability, the ASTM subgrade soil test, constants, etc."

The above approach on the pond sealing problem although extremely basic and detailed is the first lead that has been found to explain why two soils having apparently similar proportions of sand and clay will behave so differently when compacted or given other treatment and then subjected to various heads of water to determine their resistance to seepage. From the above information, it is now believed that when the range in particle size in the clay and sand classes is known, it will be possible then to isolate the factors that are causing the variations and results when tested for degree of sealing. If this is true, it should give a guide to fieldmen by which they may determine soil materials necessary to mix into the pond floor to achieve adequate sealing.

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Rain-fall during the first part of the period was rather heavy as will be noted from the following records:

	September 1948	September 1947
Redland and Mowry	22.25	10.77
Sub-Tropical	23.88	10.37
Princeton Grove	21.20	11.61
Cooper Grove	19.80	9.12
West Mowry	19.26	13.66
Roberts and Avocado	22.99	9.73

"On September 20 the water table at Well #5 was about a foot below ground surface. This high water table with an average of 6 to 8 inches during the storm brought the water table to or about the ground surface for the area.

"Due to a strong west wind on September 22 shoving the tide out we had a rather fast runoff of the surface water in the lower and middle portion of the area. From August 30 through September 22 we had gains in our water table on the Redland profile of 1.35 feet to 3.87 feet. On the Eureka profile, gains of 2.01 to 3.13 feet were recorded. Gains on the Mowry Street profile varied from 1.50 to 3.13 feet. For the period September 22 to October 4 only a few scattered showers fell throughout the area. As a result we had a loss in our water table over the area ranging from 0.25 foot in the northern part of the Redland profile to 2.64 feet in the middle of the area and to 0.95 foot in the lower part of the area.

"Losses on the Eureka profile were not as great ranging from 0.51 foot to 1.05 foot. In the middle portion of this profile an actual gain was recorded during the period. Losses on the Mowry Street profile ranged from 0.6 foot to 2.04 feet.

"For the period August 30 to October 4 the gain in water table for the Redland profile varied from 0.48 to 1.86 feet. For the Eureka profile 1.50 to 2.42 feet and 0.90 to 1.07 foot for the Mowry Street profile.

"The water table at Well #5 on September 30, 1948 was 6.46 feet m.s.l., on September 30, 1947, 5.32 feet m.s.l., and on September 30, 1946, 4.46 feet m.s.l.

"In connection with our nitrate leaching studies analysis of samples collected from the various areas indicate that where the higher organic types of nitrogen fertilizers are used, that portion available is lost but there is a reserve which will break down to nitrate. This was found true for cyanamide as well as the higher organics. To date our data show that there is a more constant supply over a longer period of time when using the higher percentages of straight organic fertilizers or nitrogen fertilizers that break down rather slowly.

"Our data also indicate that when using nitrogen materials which break down rather fast as urea, or ammonium sulfate, unless there is an absorption media the materials are dissipated rather fast. It is thought that we lose quite a bit as ammonia."

Drainage Studies - Ellis G. Diseker, Raleigh, N. C.-"Recently a 4.2 inch rain fell at the Plymouth Station during a 6-hour period at a time when the soil was reasonably wet. By 7:00 o'clock a.m., which was 7 hours after the rain started, the water in the newly widened McRae Canal had risen to a total depth of only 3-1/2 feet at the highway bridge culvert, and the higher water level was 18 inches below the discharge of the 4-foot depth tile main. The hydraulic gradient was 2-1/2 and 3-1/2 feet respectively, below the 2- and 3-foot depth tile main outlets. The following morning the water had receded 18 inches. The flood water did not overflow a portion of Plot A near the highway as it normally did before deepening and widening of the canal, despite the fact that the highway department has recently opened up their highway ditches which permitted a high rate of discharge in the canal at the highway culvert.

"Serious siltation and bank caving has resulted from opening up of the highway ditches into the canal due to overfalls into the canal since the highway did not provide headwalls or aprons."

Drainage Studies - I. L. Saveson, Baton Rouge, La.-"The ditch spacing area on the Westover Plantation was planted to sugarcane during the month of September. This area consists of cuts of the following widths: 130 feet, 190 feet, 250 feet, and 310 feet. Wells and moisture blocks are to be installed to determine the correct width of cut for mixed sugarcane land. This area was laid out and ditches dug this summer.

"Average yields of the corn from the various treatments, without correction for stand, were:

Irrigation plan	Fertilizer and plant rates			
	A	B	C	D
	Bushels per acre			
Irrigate all season	69.8	70.4	84.3	81.7
Irrigate only at fruit- ing stage	60.8	66.3	73.3	69.1
No irrigation	57.1	68.1	73.7	74.8

"These results are clouded because of the variation in stand from the several plots. During the harvesting process, a separate record was obtained from those plants that were separated the correct distance from adjacent stalks, or in other words were not adjacent to skips. Assuming that the yield from these stalks reflected what the yield would have been had a perfect stand existed on all plots, we have the following results:

Irrigation plan	Fertilizer and plant rates			
	A	B	C	D
	Bushels per acre			
Irrigate all season	109.5	120.3	130.3	*
Irrigate only at fruit- ing stage	119.8	124.4	154.2	*
No irrigation	95.4	97.7	115.1	*

\* Insufficient plants for this determination.

"The number of hills in the several plots from which the foregoing yields were calculated varied quite widely.

"The pounds per hill, derived from the pounds of shucked ear corn per plot divided by the number of hills harvested probably gives a better index of the relation between the irrigation, fertilizer and plant population variables. The pounds per hill, without correction for stand, from the respective treatments showed:

Irrigation plan	Fertilizer and plant rates			
	A	B	C	D
	Pounds per hill			
Irrigate all season	.701	.711	.777	1.275
Irrigate only at fruit- ing stage	.727	.797	.864	1.239
No irrigation	.603	.620	.723	1.115

"These data indicate that:

1. Irrigation only at fruiting stage was superior to irrigation during the growing and fruiting stage in 1948.
2. Both methods of irrigation increased the yield over no irrigation.
3. Increased quantities of nitrate application gave increased yields. (C over B and A).
4. Increased plant population gave an increase in yield (D over C).

Statistical analyses for the significance of these increases were not completed at the end of the month."

IRRIGATION DIVISION

Drainage Studies.-J. H. Maughan reports completion of project on "Activities and Needs of Utah Drainage Districts". The manuscript covering this research is now in the hands of the printer. It will be published by the Utah Agricultural Experiment Station inasmuch as it is a cooperative project with the Utah Station.

Management of Related Irrigation and Drainage Enterprises.-J. H. Maughan reports progress on a new project designed to establish principles basic to consolidation of irrigation and drainage enterprises using water from a common source or depending upon a common outlet for drainage waters. The study is being made in the Lewiston-Preston area on the boundary between Utah and Idaho. It involves a consideration of both irrigation and drainage enterprises, many of which overlap on the same land.

Snow Cover-Runoff Investigations.-Don Mitchell reports progress in his study of effect of fall rains, soil moisture and vegetal cover on yield from watersheds. Two weather stations have been established on the Logan River watershed at elevations 7,500 and 8,500 feet. These stations are equipped with a standard rain gage, a recording rain gage and a recording thermograph. Soil moisture samples are taken each time the charts on the recorders are changed.

Canal Linings - Field Installations.-Work was continued on the installation of experimental linings for the Richmond Irrigation Company Canal and at North Logan. The standard concrete section of canal upstream from the High Creek diversion, together with the High Creek crossing and drop structure, were largely completed. In addition, 100 linear feet of butyl coated fiberglass lining was installed in the main canal and 200 linear feet in the west lateral. The butyl coated fiberglass at North Logan which was damaged in testing was repaired and an additional length of the butyl coated fiberglass installed.

Butyl coated fiberglass was installed in Section 8D at the River Laboratory, completing the lining installations in this channel, and routine measurements begun. The asphaltic concrete, as expected, being of substandard quality, was quite permeable. The soil cement sections, contrary to expectations, were also fairly permeable.

Spreading Water for Storage Underground.- A. T. Mitchelson, Dean C. Muckel, H. K. Rouse, E. S. Bliss, and C. Johnson.-Work on a large scale experimental spreading unit on the Kaweah Delta near Tulare is about to be undertaken. The Kaweah Delta Water Conservation District and the Bureau of Reclamation join in the experimental treatment of an area to be selected by a group representing all parties participating. On November 8th and 9th field inspection is to be made of four or five areas ranging

in size from 20 acres to 160 acres. It is planned to select an area where soil conditions, topography, water supply and accessibility are all favorable. Since in all cases where cotton-boll hulls have been used, the treatment has been favorable, it is planned to accept an area where the plot can be divided into two ponds of equal size in order to treat one and hold the other untreated as a check pond. A nice size would be a 10-acre area divided into two 5-acre ponds. To make the ponds larger would require procurement of a rather large quantity of hulls. Water will be diverted from the stream under control until canal water is obtainable from Friant-Kern canal, expected to be early in 1949. The Bureau will then furnish the water. Preliminary soil surveys have been made of the most promising areas.

Operation of the buffer ponds at the Wasco spreading area were continued throughout the month. For the period up to October 19, the operations were in the same manner as during the 80-day run which ended on June 1. On October 19, flow of water into the outer (annular) pond was stopped, and it is being permitted to dry up while flow is continuing into the inner pond.

For the 29 days that both ponds were in operation, the general results followed a pattern quite similar to that of the comparable period of the first run. At the time water was turned off from the outer pond, the rate of percolation in the inner pond was approximately 40 percent higher than in the outer pond.

The peak rate reached in the inner pond was 5.26 feet per day on the 10th day of the run. This compares with a peak rate of 6.90 feet per day during the first run, which was also reached on the 10th day of that run.

The peak rate in the outer (annular) pond was 4.62 feet per day reached on the 4th day of the run. This compares with a peak rate of 4.30 feet per day reached on the 12th day of the first run.

Microscopic study was made of the water in the buffer ponds at the Wasco spreading area on several occasions. The types of algae and numbers of protozoa found by the microscopic examination were quite different and probably accounted for the marked differences noted in the field observations. The inner pond contained a filamentous type of algae, while the outer pond contained a single-celled type. The outer pond had a much higher protozoan population than the inner pond. Further studies were not possible because the laboratory has not been completed and several pieces of necessary equipment have not yet arrived.

Upper Santa Ana River - Dean C. Muckel, Pomona, Calif. - "A report entitled 'Progress Report on Rainfall and Irrigation Water Penetration and Consumptive Use in the Chino Basin, Santa Ana River Valley, California' was completed. It consists of three parts: (1) Deep penetration from rainfall and irrigation; (2) Consumptive use in the Valley of Santa Ana River between Riverside Narrows and the Orange County Line, both by Dean C. Muckel and, Part 3, Soil Characteristics as Related to Penetration of Rainfall and Irrigation Water, by V. S. Aronovici. It was concluded that deep penetration of rain falling on the valley floor varies considerably from year to year depending partly on the seasonal amount of rainfall and partly on the distribution. During the period 1928-29 to 1946-47 the deep penetration of rain varied from 990 to 219,840 acre-feet per year, with an average of 58,000 acre-feet. In some years, the rain is of such quantity and so distributed that almost all is utilized in the replenishment of the fall soil moisture deficiency and in supplying the winter evapo-transpiration losses.

"Penetration of rain also varies with different types of plant cover. Deep-rooted non-irrigated plants draw moisture from the soil to depths 12 or 15 feet and cause an initial fall moisture deficiency of as much as 10 acre-inches per acre, which must be replenished before deep penetration can occur. With irrigated and shallow-rooted crops, the initial fall deficiencies are much less; consequently, deep penetration occurs with smaller amounts of rain."

"Deep penetration of irrigation water is more or less constant from year to year, varying principally with the length of the irrigation season, (assuming there has been no change in the irrigated area or type of crops). Variations occur generally with different types of crops and different methods of irrigation; further variations are brought about by the vagaries of the individual irrigator."

"Penetration of irrigation water during the period 1927 to 1946, inclusive, averaged 19,935 acre-feet per year with the maximum and minimum being 23,000 and 14,000 acre-feet, respectively."

Soil Transmissibility Studies, Soil Conservation Districts - V. S. Aronovici, Pomona, Calif. - "The laboratory work is nearly completed on an evaluation and comparison of several techniques of measuring soil transmissibility. Emphasis was placed entirely upon laboratory techniques. A program of evaluating transmission rates by various methods with field observations will comprise the second half of this study. Comparisons were made of the following methods:

1. Standard procedure recommended by Washington. This procedure utilizes an open effluent face of the soil sample. Discharge is measured by the quantity of water entering the soil surface less the quantity of moisture gain in the soil sample during the run. Runs are restricted to one hour.
2. Measurement of effluent using standard equipment. This method measures the effluent from an open effluent face. Observations are intermittently made for a varying period depending upon the gross effluent.
3. Submerged outlet. This equipment was identical to method No. 2 except that the outlet was raised slightly above the level of effluent and of the soil column, thus eliminating the free interface.
4. Utilization of various tensions. This procedure utilizes a Leamer-Shaw tension table. Various tensions were applied to the base of the standard soil cylinder.
5. Utilization of the Multiple Manometer Discharging Permeameter. These samples were run for several weeks and utilized special equipment.

"In addition to these tests, study was made of the relative transmission rates when the samples were pre-saturated and not pre-saturated. Degrees of saturation were also observed. All observed rates were reduced to standard coefficients. That is, the values were converted to unit head, unit surface area, unit time, unit length of column at 20 degrees centigrade."

Upper Colorado River Basin - Harry F. Blaney, Los Angeles, Calif. - "The provisional and confidential report by Harry F. Blaney and Wayne D. Criddle on 'Consumptive Use of Water Rates in the Upper Colorado River Basin' was approved by the Engineering Advisory Committee of the Upper Colorado River Basin Compact Commission, and submitted to the Compact Commission at their meeting at Santa Fe, New Mexico early in October.

"The Compact Commissioners of the five Upper Basin States and the Federal representative signed the Compact on October 11, 1948. The Upper Colorado River Compact apportions water allotted to the States as follows: Colorado, 51.75 percent of available water; Utah, 23 percent; Wyoming, 14 percent; and New Mexico, 11.25 percent; and Arizona, 50,000 acre-feet annually. The apportionment of water was made primarily on the basis of consumptive use and the water available. The compact indicates that a curtailment during drought periods shall be in proportion to the consumptive use of each Upper Basin State, rather than in proportion to the total allocation.

San Fernando Valley Investigation - William W. Donnan, Los Angeles, Calif.- "A series of soil samples to a depth of 6 and 12 feet are being taken at representative locations to determine fall deficiencies of soil moisture before seasonal rainfall begins. This work is being done in connection with a determination of return flow to the ground water basin from rainfall and irrigation. In the irrigated areas two sites each were chosen on walnuts, citrus, alfalfa and beans, and one each on tomatoes and truck crops. In the non-irrigated areas two sites each were chosen on grain-hay, brush and grass-and-weeds. These data, together with data from work carried on by Blaney, Stockwell, et al in 1939 and 1940 will be used to determine initial fall deficiencies in the soils of San Fernando Valley. At the same time, rainfall records are being compiled for the period 1927-28 to 1944-45 to determine seasonal amounts of rainfall. From data in the files of the State Water Resources Office, records of the amount of irrigation and domestic water imported to and exported from the basin for this period of years are also available. These data will form the basis of our water balance study of the cyclic rise and fall of the underground water table."

Imperial Valley Investigations - George B. Bradshaw, Imperial, Calif.- "In June 1947 a study of evaporation from Salton Sea was started. This program was integrated with the drainage and irrigation studies of Imperial Valley since evaporation from the surface of Salton Sea is the only outlet for drainage and waste waters of the basin.

"During 1947, three evaporation studies were located on the borders of Salton Sea. The Sandy Beach Station is located on the southwest, the Devil's Hole Station on the north, and the Salt Farm Station on the south-east margin of the Sea. The stations are equipped with two-foot Young-type screen evaporation pans, anemometers, rain gages, hygrothermographs and maximum and minimum thermometers. The Sandy Beach Station also has a Standard Weather Bureau-type evaporation pan. The reason three stations are needed for this investigation is because of the suspected variations in evaporation rates around the periphery of this large body of water. The prevailing winds are from the west across arid reaches of the California desert.

"The first year's data on evaporation rates from the three stations indicated the wide variation in evaporation due to variations in humidity and wind movements.

"Evaporation from two-foot screen pans along the shores  
of Salton Sea, Imperial Valley, Calif.

Month	Sandy Beach pan		Devil's Hole pan		Salt Farm pan	
	: Wind		: Evaporation		: Wind	
	Miles/Hr.	Inches	Miles/Hr.	Inches	Miles/Hr.	Inches
<u>1947</u>						
September	2.67	10.22 <sup>1/</sup>	2.85	8.70	3.79	9.26
October	4.37	9.40	2.55	7.54	3.11	7.60
November	3.75	6.58	2.06	4.78	3.48	5.51
December	2.76	4.28	1.84	2.86	2.56	3.12
<u>1948</u>						
January	3.04	3.83	1.63	3.77	2.83	3.58
February	5.36	5.43	2.90	4.14	4.23	4.17
March	6.75	7.51	3.20	5.96	2.60	6.17
April	5.88	10.71	3.99	8.93	7.52	7.68
May	6.51	13.92	3.82	10.33	5.22	9.47
June	5.97	12.69	3.56	11.19	4.62	10.04
July	5.42	16.81	3.16	11.74	4.15	10.81
August	4.73	15.63	2.43	12.57	3.62	10.06
Total Year		117.01		92.51		87.47

1/ Part of month estimated."

Irrigation Studies - Dean W. Bloodgood, Austin, Texas.-"At the Jack Keisling farm near El Indio, where we carried on cotton irrigation studies during the past season, all of the cotton had been picked and the field had been plowed preparatory to next year's planting. The average yield on 100 acres was about 3/4 bale of lint cotton per acre. The low yield was attributed to shortage of water during the summer and an unusual infestation of pick boll worm. The same field will be irrigated about November 15th or 20th for next year's cotton. The early irrigation (while plenty of water is available) and added winter precipitation will store the maximum amount of moisture in the soil to start the cotton crop that will be planted next March or April. Very good water measurement data were obtained, but the amount has not been computed at the time of writing of this report. Mr. Keisling has set aside some of his land for experimental studies of 'level irrigation' being promoted and sponsored by the Operations Division, SCS, Fort Worth.

"On November 3rd the land owners in the Eagle Pass Area will have an election on the creation of the proposed Maverick County Soil Conservation District. On November 1 bids will be opened for the construction of

approximately 19.4 miles of distribution laterals in Maverick County Water Control and Improvement District No. 1. Most of these laterals will be lined and Parshall flumes or weirs will also be installed in some of the lined ditches for measurement of irrigation water to the farms. The lateral construction is a part of the \$900,000 reconstruction program for the District. The low water diversion dam near the headworks of the main canal (diversion of water from the Rio Grande) has been completed and has already withstood high flood waters of the Rio Grande during recent months.

Stephen J. Mech, Prosser, Washington.—"Field work for the season has been completed. The water in the Sunnyside Canal was turned off on October 20 and the potato plots were harvested on October 26.

"The two inside rows of each plot were harvested for yield records. These are now being graded and weighed. Results for plots irrigated 2, 4 and 8 times after planting will be presented in next month's report.

"A number of conspicuous differences were apparent during the harvest operations. The plots whose available soil moisture was maintained between 75 and 100 percent showed more wireworm damage than the plots whose available moisture was permitted to drop lower between irrigations. It seemed also that though the tubers on the 75 - 100 percent plots were large, they were very rough and knobby. The smoothest potatoes were found on the plots whose minimum available soil moisture was 60 percent. Those on the dry (35 - 100 percent) plots were smooth but lacked size.

"Then observations show that potatoes can be kept too wet for maximum production of quality tubers. Irrigating 8 times from July 27 - September 30 was no better than irrigating 4 times during the same time. Irrigating only twice, on August 9 and September 8, apparently resulted in smaller tubers. All plots were well irrigated before planting."

Sprinkler Irrigation Studies - W. D. Criddle, Boise, Idaho.—"During the month Mr. Claude Pair, formerly stationed with Operations at Wenatchee, Washington, has joined our staff to work on sprinkler irrigation investigations. Since arriving on the job about the 17th of the month, Mr. Pair has prepared a tentative outline of work which might be undertaken and has also compiled a complete bibliography of information on sprinkler irrigation and on research workers and others in the sprinkler irrigation field.

Cooperative Consumptive Use Studies in Utah.—"During the month considerable time was devoted to preparing an outline for a progress report on the cooperative consumptive use studies being conducted in the Colorado River Basin of Utah. Also crop boundaries on the overlays used to map the crops in the field have been checked on the pictures and a beginning has been made on the computation of the cropping acreages by sections. A progress report of this past year's study is planned for shortly after January 1, 1949.

Conservation Irrigation Bulletin.—"The preparation of a miscellaneous bulletin entitled 'Conservation Irrigation' is under preparation with Mr. McCulloch, Head, Engineering Division at Portland. A draft of this bulletin has been prepared and will be distributed to various people for criticism and suggestions in the near future. It is therefore hoped that this bulletin can be followed by a technical bulletin giving information on methods of irrigation to use for various site conditions, recommended lengths of runs, size of streams to use, leveling necessary for each method of irrigation, etc. It is felt that there is a big need for such a bulletin. At the present time there is no place where a person can go to get the detailed information on how to prepare the land for irrigation, lay out the irrigation system and install the proper irrigation methods and practices on a farm."

Well Screen Performance Tests - Carl Rohwer, Fort Collins, Colo.—"Tests of the distribution of flow through Johnson Well Screens, as measured with a small current meter inside the screen, showed that the velocity through the perforations was highest near the bottom of the screen and that it decreased rapidly as the distance from the bottom increased. This phenomenon has not been completely analyzed but it may be of considerable importance in connection with irrigation wells.

"Gilbert Corey completed tests on the hydraulic properties of 12-inch punched screens with 1/16, 1/8 and 3/16-inch perforations. These tests show that the loss through punched screens of this type is much higher than that through Johnson screens with perforations of the same width. Because the actual area of opening is so much smaller in punched screens, it was not possible to get the same quantity of water through these screens with the head available as was easily discharged by Johnson screens.

Friction Losses Through Pipes and Fittings.—"Equipment was installed and tests were made of the friction losses through a standard 6-inch check valve for discharges ranging from 100 to 800 gallons per minute. Before making these tests a slight change was made in the valve which increased the opening through it. This change reduced the losses considerably as compared with the tests made before the opening was increased. The study of this valve will be completed this week if the weather remains favorable."

R. A. Wark and W. T. Frost.—A report of 1948 forecast accuracy and remaining reservoir storage was completed for West-wide release. The few Oregon forecasts which can be evaluated at this early date are all below the actual flow due to the excessively abnormal precipitation during the first three months of the forecast period. There follows a tentative evaluation of several forecasts:

<u>Station</u>	<u>Forecast</u>	<u>Obtained</u>
Owyhee R. Above Reservoir	225,000 a.f.	234,620 a.f.
Upper Klamath Lake Inflow	435,000 a.f.	474,800 a.f.
No. Fk. Rogue River	325,000 a.f.	330,400 a.f.

Considerable time has been given to improvements in our snow-runoff relation studies for the Owyhee and Malheur rivers. Severe drought conditions this year have resulted in greatly subnormal reserves of stored water at the close of this irrigation season, and prospects for the coming 1949 season are poor indeed without a heavy winter this year.

In connection with the possible critical nature of the 1949 water supplies for the Malheur-Owyhee area, we are meeting with the local water users in Ontario, Oregon, on October 28 to discuss the problem in detail and determine what types of forecasts will be most helpful to them.

Clyde E. Houston, Reno, Nevada.—"During the past month four new snow survey courses were established in Nevada. One in the northwestern part of the state near the Oregon line on McDermitt Creek Watershed. This course was established at the request of the Nevada State Engineers to assist with their administration of the waters of McDermitt Creek and Quinn River. Two courses were established in the Southeastern part of the state near the Utah line on Meadow Valley Wash Watershed. These courses were established at the request of the County Agent in order to assist with their flood warning on Meadow Valley Wash. These courses will be of assistance to Union Pacific Railroad and Moapa Valley water users. One course was established in the Virgin Mountains in the Southeast corner of the State at the request of the Clarke County Agent. The course was located at the head of the intake for the domestic water supply of the town of Mesquite, Nevada, and will aid them in forecasting domestic supplies."